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Santa Ana Region

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TO: Gerald Bowes, Ph.D.
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FROM: Wanda Marquis-Smith, Chief
Coastal Waters Planning Section
SANTA ANA REGIONAL WATER QUALITY CONTROL BOARD

DATE: May 18, 2005

SUBJECT: **REQUEST FOR PEER REVIEW OF DRAFT ORGANOCHLORINE COMPOUNDS TMDL FOR THE SAN DIEGO CREEK AND NEWPORT BAY WATERSHED, ORANGE COUNTY, CA**

Santa Ana Regional Board (SARWQCB) staff hereby request initiation of peer review for a proposed Basin Plan amendment to incorporate a Total Maximum Daily Load (TMDL) for chlordane, total DDT, total PCBs, dieldrin, and toxaphene in San Diego Creek; chlordane, total DDT, and total PCBs in Upper Newport Bay; and chlordane, total DDT, total PCBs, and dieldrin in Lower Newport Bay and Rhine Channel.

The proposed Basin Plan Amendment (BPA) and supporting documentation will be available for peer review by August 30, 2005. We plan to initiate the public participation process to adopt the proposed BPA at the September 30, 2005, Santa Ana Regional Board meeting (public workshop), with the BPA Public Hearing and possible Regional Board adoption tentatively scheduled for January 2006.

To assist in the selection of peer reviewers, the following documents are attached:

(1) Summary of the Proposed San Diego Creek/Newport Bay TMDL;
(2) Description of the proposed TMDL; and
(3) Listing of all personnel, including university scientists, external to the SWRCB and RWQCB organizations who have been involved in the San Diego Creek/Newport Bay TMDL, including development of the TMDL.

We believe that an ecotoxicologist with knowledge of the bioaccumulative effects of organochlorine compounds in freshwater and marine environments, an environmental organic chemist with knowledge of the fate and transport of organochlorine compounds, and a watershed hydrologist with knowledge of sediment modeling, should conduct the peer review of this proposed TMDL.

Once you have identified peer reviewers for this TMDL, we will forward to them the TMDL Staff Report and proposed Basin Plan Amendment. Should you have any questions, please contact me at wmarquis-smith@waterboards.ca.gov, (951) 782-4468; or you may contact Kathy Rose at krose@waterboards.ca.gov, (951) 321-4585.

Attachment 1
Summary of Proposed Basin Plan Amendment

Newport Bay/San Diego Creek Watershed Organochlorine Compounds TMDL – Summary

The Newport Bay/San Diego Creek watershed is located in Orange County, California, and encompasses 154 square miles. The watershed includes portions of the cities of Newport Beach, Irvine, Laguna Hills, Lake Forest, Tustin, Orange, Santa Ana, and Costa Mesa. The watershed consists of the Tustin Plain, bounded on the east by the Santiago Hills and the west by the San Joaquin Hills. Runoff from these mountains drains through the Tustin Plain and ultimately discharges to Upper Newport Bay (the Upper Bay) via San Diego Creek. San Diego Creek provides about 95% of the freshwater flow into the Upper Bay. The remaining freshwater contributions are from Santa Ana Delhi Channel, Big Canyon Wash, Costa Mesa Channel, and numerous storm drains discharging to the Upper Bay.

Newport Bay consists of a highly developed Lower Bay south of the Pacific Coast Highway bridge, and a less developed Upper Bay north of the bridge. The Lower Bay contains numerous boat yards and marinas, and provides anchorage for several thousand recreational boats. The Rhine Channel is an approximately 20 acre dead-end reach on the western side of the Lower Bay. This channel has poor tidal flushing, and has been identified as a toxic hot spot (BPTCP, 1997).

The Upper Bay is recognized as an important southern California estuary. The Bay historically received little freshwater input until the 1960s when San Diego Creek was channelized to discharge into the Upper Bay. Thus, the watershed drainage area greatly increased, an estuarine environment was created, and beneficial uses associated with an estuarine environment developed. The Upper Bay contains a 752-acre ecological reserve that provides habitat for six endangered bird species and two endangered plant species.

The watershed contains large areas of open space, mainly in the foothills and areas where development has not yet occurred. Agriculture was once widespread, but as agricultural lands give way to urbanization, these lands currently account for only about 5 percent of the total watershed area and are largely confined to areas north of the Interstate 5 highway. About 75% of the total watershed area has been urbanized.

Beneficial uses of San Diego Creek, Reach 1, include water contact recreation (REC1), non-contact water recreation (REC2), warm freshwater habitat (WARM), and wildlife habitat (WILD). San Diego Creek, Reach 2, (above Jeffrey Road to the headwaters) is designated with the same beneficial uses, except they are designated as intermittent. In addition, Reach 2 has an intermittent groundwater recharge (GWR) beneficial use.

Beneficial uses of the Upper Bay include REC1; REC2; Commercial and sportfishing (COMM); habitat of special biological significance (BIOL); WILD; habitat for rare, threatened or endangered species (RARE); habitat for spawning, reproduction and development (SPWN); marine habitat (MAR); shellfish harvesting (SHEL); and estuarine habitat (EST). Beneficial uses of the Lower Bay, including the Rhine Channel, include navigation (NAV), REC1, REC2, COMM, WILD, RARE, SPWN, MAR, and SHEL.

In the early 1990s, San Diego Creek, Upper and Lower Newport Bay, and Rhine Channel were placed on the Clean Water Act Section 303(d) list of impaired waterbodies, due, in part, to violations, or threatened violations, of the Basin Plan narrative objectives for toxic substances.
The narrative objectives state:

(1) Toxic substances shall not be discharged at levels that will bioaccumulate in aquatic resources to levels which are harmful to human health; and
(2) The concentration of toxic substances in the water column, sediment or biota shall not adversely affect beneficial uses.

The listings were based on data obtained from the State Mussel Watch Program (SMWP) and Toxic Substances Monitoring Program (TSMP), which showed evidence of declining, but continuing, bioaccumulation of DDT, PCBs and other toxic substances in fish and mussel tissue at levels which could potentially threaten the biota.

On October 31, 1997, USEPA entered into a consent decree, Defend the Bay, Inc. v. Marcus (N.D. Cal. No. C97-3997 MMC), which established a schedule for development of technical TMDLs in Newport Bay and San Diego Creek. Because SARWQCB staff was unable to develop the TMDLs for toxic substances by the consent decree deadline, USEPA was required to do so; and technical TMDLs for toxic substances, including organochlorine compounds, were established on June 14, 2002.

The following table identifies the water body/pollutant combinations the organochlorine compounds (OCs) TMDLs address:

Pollutant	San Diego Creek	Upper Newport Bay	Lower Newport Bay	Rhine Channel
Total DDT	X	X	X	X
Total PCBs	X	X	X	X
Chlordane	X	X	X	X
Dieldrin	X		X	X
Toxaphene	X			

The draft TMDLs and supporting technical report (the staff report) provide the basis for the recommendation that the Regional Board consider changes to the Implementation Plan (Chapter 5 of the Santa Ana River Basin Plan) to incorporate an organochlorine compounds TMDL for San Diego Creek and Newport Bay that includes the following components: problem statement; final numeric targets for total DDT, total PCBs, chlordane, dieldrin, and toxaphene, wasteload allocations for point source discharges; load allocations for nonpoint source discharges; an implementation plan and schedule of compliance with the TMDL; a monitoring program for determining the effectiveness of the TMDL; and a margin of safety.

Attachment 2

Proposed San Diego Creek/Newport Bay Organochlorine Compounds TMDL

Description of Scientific Issues to be addressed by Peer Reviewers

The statutory mandate for external scientific peer review (Health and Safety Code Section 57004) states that the reviewer's responsibility is to determine whether the scientific portion of the proposed rule is based upon sound scientific knowledge, methods, and practices.

We request that you make this determination for each of the following issues that constitute the scientific portion of the proposed regulatory action. An explanatory statement is provided for each issue to focus the review.

1. The nature of the water quality problem

Problem statement: This section of the TMDL Staff Report describes the basis for concluding that San Diego Creek and Newport Bay are impaired by elevated levels of organochlorine pesticides and PCBs. The problem statement includes a review of the historic information used to include San Diego Creek and Newport Bay on the CWA Section 303(d) list, and summarizes existing conditions using historic data and data collected since San Diego Creek and Newport Bay were placed on the CWA Section 303(d) list.

San Diego Creek, Upper and Lower Newport Bay, and the Rhine Channel were placed on the Clean Water Act Section 303(d) list in the late 1980s and early 1990s based on a finding of impairment due to elevated levels of pesticides in fish tissue and toxicity. The sources of impairment were identified as agriculture, urban, and nonpoint source. Monitoring results from the SWMP and TSMP over a 20 year period (approximately 1980-2000) show exceedances of USEPA and California Office of Environmental Health Hazard Assessment (OEHHA) fish tissue screening values in San Diego Creek and Newport Bay, indicating bioaccumulation of the OC pesticides and PCBs and violation of the narrative water quality objectives (SARWQCB, 2000). Although fish tissue concentrations have declined over the past 20 years, exceedances of fish tissue screening values still frequently occur.

In promulgating the technical TMDL for toxic pollutants for San Diego Creek and Newport Bay (2002), USEPA independently evaluated the need to develop TMDLs for each of the pollutants identified in the consent decree. USEPA's evaluation used a two-tiered, weight-of-evidence approach whereby all available water column, sediment quality, and fish/shellfish tissue data were analyzed to determine if there was clear evidence of impairment with probable adverse effects (Tier 1) or incomplete evidence and/or evidence of possible adverse effects (Tier 2). Their approach is discussed thoroughly in the USEPA TMDL Decision Document (2002). For each water body (San Diego Creek, Upper and Lower Bay, and Rhine Channel), if a chemical exceeded the screening criteria in Tier 1 with respect to any *one* of the water quality categories (water column, sediment quality, or fish tissue) then it was determined that clear evidence of impairment exists and a TMDL is necessary. If a chemical exceeded the screening criteria in Tier 2 with respect to *two or more* categories, then it was determined that an impairment, or threatened impairment, exists for that water body and a TMDL is necessary. USEPA's evaluation concluded that a TMDL was necessary for every OC compound addressed in the 2002 technical TMDLs.

2. Numeric target derivation

Numeric targets are measurable indicators that demonstrate attainment of water quality standards and can be based on either a numeric water quality objective or a numeric interpretation of a narrative objective. USEPA evaluated applicable water quality criteria and sediment and tissue screening levels to determine the appropriate targets for the OCs TMDL. Regional Board staff concur with USEPA in their determination that sediment quality guidelines should be prioritized over water column criteria and tissue screening values because: a) the OC pollutants are directly associated with sediments; b) sediments are the transport mechanism for the OC pollutants; c) limited water column data are available; and d) attainment of the sediment targets will result in attainment of the water column criteria and tissue screening values, and will, thus, be protective of beneficial uses.

Sediment target values are threshold effects levels (TELs) selected from NOAA Sediment Screening Quick Reference Tables (SquiRTs) (Buchman, 1999). Secondary targets include California Toxics Rule (CTR) water column concentrations for freshwater, and fish tissue concentrations from the California OEHHA screening values (Brodberg and Pollock, 1999). The use of sediment quality guidelines as a primary target provides a conservative interpretation of water quality standards, including the narrative water quality objectives in the Basin Plan. Studies are underway that will provide the Newport Bay/San Diego Creek watershed site-specific assessments of bioaccumulation, food web biomagnification, and consequent health threat to both wildlife and humans. Results of these studies may reveal new targets and endpoints that would be more appropriate, and revising those parameters may be necessary in the future when the TMDL is reviewed as part of the Basin Planning process.

3. Source identification

All of the OC pollutants are banned from current use, and discharges are believed to be in association with erosion of sediments to which the pollutants have adsorbed. Therefore, the source assessment is primarily qualitative, taking into account each pollutant's physical and chemical properties, their expected uses and the locations of those uses, and available monitoring data. Data suggest that sediments within Newport Bay are essentially an existing "reservoir" of historically-deposited pollutants, with this reservoir currently receiving relatively low levels of ongoing pollutant loading via erosion and sediment deposition processes within the San Diego Creek watershed. Deposited sediments are subject to redistribution within the Bay via internal circulation. Research on fluvial transport of DDT and other legacy pesticides in the Upper Bay suggests that these pollutants likely originated in the watershed when they were applied to agricultural and urban sites. Erosion and sediment transport from sites upon which legacy pesticides were applied or PCB spills occurred, can result in the discharge of these pollutants into the Creek and Bay. The amount of deposition would depend on the intensity and duration of storm events, soil erosivity, and residual concentration of the pollutant in the soil.

4. Linkage Analysis/Loading Capacity

The linkage analysis investigates the relationship between OC pollutant loadings and water quality effects in order to calculate loading capacities for each pollutant in each water body.
The loading capacity is the maximum amount of a pollutant that may be received by a water body and still achieve water quality standards. It is the critical link between applicable water quality standards (as interpreted through numeric targets) and the TMDL.

None of the OC pollutants are currently in use. Due to their hydrophobicity, pollutant residues are expected to be associated with soils and sediments, with very low concentrations dissolved in the water column. The relatively low concentrations currently remaining in the environment are not expected to present an acute water quality threat to humans or wildlife, but present more of a chronic threat primarily through bioaccumulation in the food web of sensitive wildlife species. Relatively low concentrations of the OC pollutants, in dissolved form or associated with stream and in-bay sediments, can biomagnify up the food chain to concentrations that are several orders of magnitude higher in fish and piscivorous birds, reaching levels that can cause harm (e.g., reproductive failure).

Pollutant concentrations in fish tissue that exceed OEHHA screening values, and measured sediment concentrations that exceed low sediment quality guidelines, are evidence of bioaccumulation in wildlife, and violation, or threatened violation, of the Basin Plan narrative water quality objectives for toxic substances. Because the OC pollutants are transported to the Creek and Bay primarily via sediments, and because pollutants associated with sediments can be subject to food-chain transfer and ultimately result in adverse effects to wildlife and/or humans, a sediment endpoint for the TMDL is appropriate.

Multiple TMDLs have been developed for the Newport Bay/San Diego Creek watershed, and consistency among TMDLs is essential. A sediment TMDL for San Diego Creek and Newport Bay is being implemented, and allows 62,500 tons of sediment per year to be discharged to each water body. For San Diego Creek, the freshwater sediment target value for each of the OC pollutants (TELs from NOAA SQuiRTs) was applied to the maximum allowed sediment load to the creek to calculate the loading capacity of each OC pollutant. For Newport Bay, Resource Management Associates (RMA) modeled the volume and in-bay distribution of sediment deposition based on estimated existing sediment discharges to the Bay (RMA, 1997). The fraction of the 62,500 tons of the Bay's annual sediment loading that is allowed among Upper Newport Bay, Lower Newport Bay, and the Rhine Channel was extrapolated from the modeled sediment loads and in-bay distribution patterns. The marine sediment target values for each of the OC pollutants (TELs from NOAA SQuiRTs) were then applied to the estimated allowed sediment load for each area within the Bay to calculate the loading capacity of each OC pollutant for Upper and Lower Bay and Rhine Channel. It was determined that if the OC pollutant concentrations in sediment do not exceed the TMDL sediment targets, then water column and fish tissue targets should not be exceeded either.

5. TMDL Wasteload Allocations (WLAs)/Load Allocations (LAs)

The TMDL allocations express the total allowable pollutant load in a water body as divided among the various pollutant sources: waste load allocations for point sources and load allocations for non-point sources. The TMDL is defined as the sum of the allocations, and that sum cannot exceed the loading capacity for each pollutant.

Because the OC pollutants are not actively used in the watershed, discharges occur primarily through erosion and transport of sediments to which the legacy pesticides and/or PCBs have adhered. The point source discharges that could potentially discharge sediments contaminated with these legacy pollutants include Caltrans (regulated under an NPDES permit), Orange County and municipalities regulated under the Orange County Municipal Separate Storm Sewer System (MS4) permit, and construction sites regulated under the State's General Permit for Construction Activities. Non-point source discharges would be expected to occur from agricultural operations and open space areas. A WLA or LA is proposed for each of the above-mentioned sources. Each individual WLA/LA is generally proportioned to the allocations identified in the sediment TMDL or to land use areas in the watershed.

6. Margin of Safety/Seasonal Variation and Critical Conditions

Margin of Safety. The TMDL contains an explicit 10% margin of safety, in addition to an implicit margin of safety through the selection of conservative approaches and assumptions. The numeric sediment target values selected, the assumed 65% sediment porosity value used in the calculations, and consistency with the sediment TMDL are all deemed to be conservative (protective) approaches.

Seasonality and Critical Conditions. The TMDL analyzes a range of potential flow conditions to address seasonal variations in loading and flows. Furthermore, the RMA sediment model incorporated various flow regimes throughout a 12-year period to predict the amounts and locations of annual sediment deposition within the Bay. There are inherent seasonal and annual variations in OC pollutant loading. The worst water quality condition would occur in years of very high rainfall in which large amounts of eroded, pollutant-laden sediments would be discharged to San Diego Creek and Newport Bay relative to the amount discharged during dry years. By setting the TMDL to a multi-year running average, seasonal and yearly fluctuations are accounted for, and the emphasis is placed on improving trends in water quality.

7. Implementation and Monitoring

When TMDLs are based on limited information, a phased approach is appropriate (USEPA, 1991). A phased TMDL includes requirements for monitoring and a schedule for reassessment of the TMDL allocations to ensure that water quality standards are attained. This TMDL follows a phased approach, and follow-up monitoring and evaluation are essential to validate and revise the TMDL as necessary.

The proposed TMDL specifies a number of activities to be undertaken by the Regional Board as well as the discharger community. The Regional Board will likely address point source discharges by revising existing NPDES permits and waste discharge requirements to implement TMDL components, or may issue new waste discharge requirements. To address non-point source discharges, the Regional Board can issue waste discharge requirements, conditional waivers of waste discharge requirements, or adopt discharge prohibitions, consistent with the State Non-point Source Pollution Enforcement policy.

Discharger actions include the development and implementation of monitoring programs and sediment reduction programs. Regional monitoring is required to evaluate the effectiveness of the TMDL in achieving water quality standards. It is recommended that additional studies be performed to identify the species in the watershed most sensitive to the bioaccumulative effects of the OC pollutants, evaluate food web pathways, and develop site-specific bioaccumulation factors (BAFs) or biota-sediment accumulation factors (BSAFs), to ensure the TMDL will be protective of the most sensitive beneficial uses.

8. "Overarching" Questions

Reviewers are not limited to addressing only the specific issues presented above, and are asked to contemplate the following "big picture" questions.

(a) In reading USEPA's technical TMDLs and the draft TMDL along with implementation language proposed by Regional Board staff, are there any additional scientific issues that are part of the scientific basis of the proposed TMDL but not described above? If so, please comment with respect to the statutory language given above.

(b) Taken as a whole, is the scientific portion of the proposed rule based upon sound scientific knowledge, methods, and practices?

Reviewers should also note that some proposed actions may rely significantly on professional judgment where available scientific data are not as extensive as desired to support the statutory requirement for absolute scientific rigor. In these situations, the proposed course of action is favored over no action.

The preceding guidance will ensure that reviewers have an opportunity to comment on all aspects of the scientific basis of the proposed Board action. At the same time, reviewers should also recognize that the Board has a legal obligation to consider and respond to all feedback on the scientific portions of the proposed rule. Because of this obligation, reviewers are encouraged to focus feedback on the scientific issues that are relevant to the central regulatory elements being proposed.

Attachment 3

Individuals Involved in the Technical Development of the Proposed Basin Plan Amendment

Agency/Company	Contact
USEPA	Peter Kozelka
Tetra Tech, Inc.	John Craig
Tetra Tech, Inc.	Leslie Shoemaker
Tetra Tech, Inc.	Jerry Diamond
Tetra Tech, Inc.	Mustafa Faizullabhoy
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